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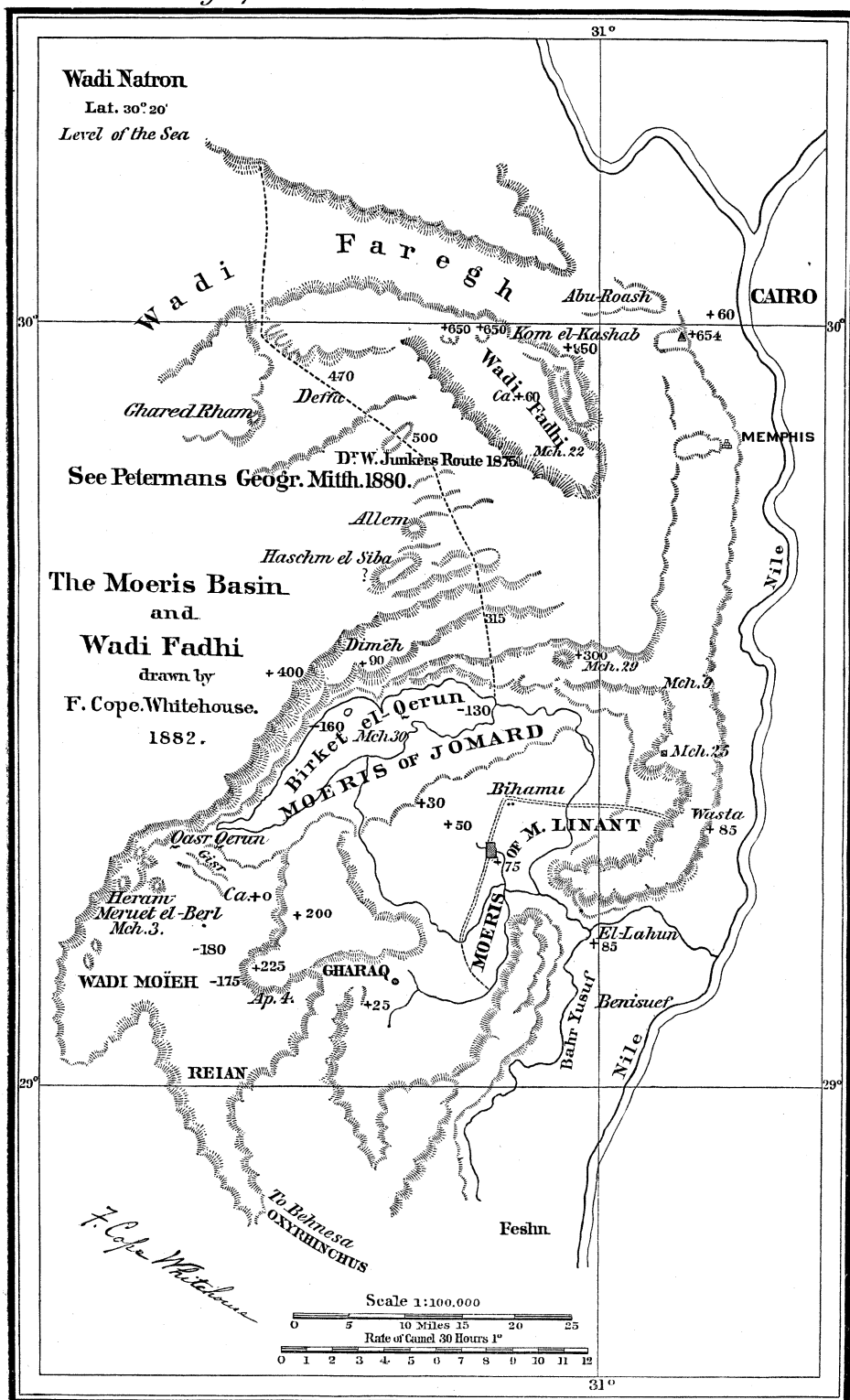
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LAKE MOERIS :  
FROM RECENT EXPLORATIONS  
IN  
THE MOERIS BASIN AND THE WADI FADHI.  
BY  
F. COPE WHITEHOUSE, M. A., Etc.

The plain of the Nile Valley to the westward of Cairo stops at the feet of the sphinx. Above rises for nearly 150 feet the broken edge of the limestone plateau, on which stand the pyramids of Gizeh. The tops of these structures, although 650 feet above the level of the Mediterranean, are not as high as the bold summit of Abu-Roash, about five miles to the south, or the crest of the slope, which, after passing the brow of that hill on whose side the pyramids are built, rises gently for seven miles to the range that bounds the horizon. The peak of the Kom el-Kashab, or "Hill of Petrified Wood," is 200 feet above the eye line of the spectator who stands upon the top of the Pyramid of Cheops. There is nothing to show the character of the desert beyond, and although but an inconsiderable distance from Cairo, it was impossible to obtain there any data from which to decide between the dead level of the latest maps and the vague lines and still more perplexing colors of those of Jacotin and Mahmoud. Both seemed to be sustained by recent publications of great weight.

The terms "Moeris Basin" and "Wadi Fadhi" are new, and require both explanation and defence. The latter is that "empty valley" or as it might be translated into French,

*la vallée vide*, which owes its name perhaps to a survival from the period of Roman occupation.

The Moeris Basin seems a convenient expression for that part of Egypt lying to the south of Cairo and west of the Nile, in which the ancient historians and geographers place the erosion or excavation which was known under the name of a mythical king, "Moeris" or "Myris," who constructed it. The basin of the lake naturally includes the adjacent coast, the hills watered by the moisture, the plain fertilized by "shadoof" or conduit, and a part of the canal of supply. It is the area covered by the accompanying map. In order to present the most striking characteristic of this basin, viz.: its depth; figures marked + show the height above the Mediterranean, and those with the sign - prefixed indicate the corresponding depth in feet below the sea. The dates mark the chief places visited. They are not given on account of any interest attaching to personal movements, but because they furnish the best corroborative evidence of what was actually accomplished. The other parts of the map scarcely need explanation. The Nile to the east skirts the Arabian Desert. There is practically no cultivation, therefore, to the right of the river. Between its broad bed and the sinuous course of the Bahr Yusuf, or 'river of Joseph,' as it is commonly called, the valley is slightly lower than the edge of the two water courses. The irrigation is almost always exclusively towards the band of productive soil embraced between them. This Bahr Yusuf, which commences where the railway terminates, now stops near El-Lahun. It once skirted the hills to the north, and although enough water was diverted near the bend between Wasta and Memphis to

make the far-famed Heracleopolis Magna and the "city" or "Island of the Nile," it continued its course to Alexandria, offering facilities for navigation, local and Euro-Indian commerce, while supplying water for irrigation and sustenance to the cities on the western side of the Delta, and even filling the last "Meri," "Maria" or "Mariut," now a salt water lagoon behind Alexandria. The "Natron" or salt valley to the west, lying at the level of the sea, might, in the recent opinion of Dr. Jordan, again receive its water from a canal quitting the Bahr Yusuf near the pyramids of Gizeh. From a pre-historic period, and certainly during the last twenty-five centuries, it has also poured in a copious stream through the hills to the west. Here an oasis, lake, marsh and fertile land, now known as the Fayoum, depends for existence on its continuous flow.\*

Such an extended claim for "Moeris" requires justification. It ought not to pass unchallenged into the category of accepted geographical facts and names. It has been decided adversely, although Bossuet was heard in its defence. The opinion of competent experts, with accurate and cautious minds, prejudiced to some extent in favor of the ancient lake, has been unanimous against it. "Moeris" was a phantasm. 'An idle tale palmed upon the Greeks first, and the Romans afterwards, was copied by writers who never visited the spot, or were too indulgent to denounce the imposition.' Such a lake, it was said, would reach from Cairo to Siût, and its surface would be as high as the Nile at the cataract of Assouan.

Investigation showed that the case had never been duly

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\* In "The Land of Khemmi" (1881), Mr. L. Olyphant has given a full account, with charming pictures, of his sojourn in this agreeable spot.

presented. An accurate translation of the old records, with a generous desire to treat them with liberality, removed the inherent contradictions, and deprived their opponents of a weapon which had been used with fatal results to historical truth. The examination of the desert also showed that modern writers had no cause to assert a superiority. The sharp contradictions disappeared ; the problem seemed to solve itself. If, therefore, ancient history be examined in the light of these late explorations, it will be seen how little room is left for dispute ; and this course has manifest advantages over elaborate argument.

“Wonderful as is the Labyrinth,” says Herodotus, “the work called the Lake of Moeris, which is close by the Labyrinth, is yet more astonishing.” ‘Its entire circuit is sixty days’ ‘tracking ;’ its circumference by land, 450 miles ; and its coast as long as the shore line from the Plinthetic Gulf, near Alexandria, to Lake Serbonis, beyond Port Said. The lake stretches in its longest direction from north to south, and in its deepest part is of the depth of fifty fathoms. The water of the lake is not due to springs. It does not well out of the ground. This inland sea is in an arid desert. The supply is obtained from the Nile by a canal. The current sets for six months into the lake from the river, and for the next six months into the river from the lake. It is manifestly artificial. It is an excavation or erosion, and the material was removed by the same agent which formed it. A branch of the Nile, rushing into it as the inundation rose, swept round it and the water charged with silt dispersed the deposit along the marshy sea-board of the Delta.’

A marked change has taken place in the degree of confi-

dence which attaches to the statements of the ancient historians. It is well understood that the Greek and his countrymen were inferior in mechanical skill, administrative sagacity and commercial enterprise to the former inhabitants of Egypt. Herodotus states this with great frankness. But its social order had been seriously disturbed. At an earlier period, civilization or specialization had reached its utmost limits. The Nile had been mastered. Its altered nature, its feminine attributes of gentleness and fecundity, were due to the great basins in Nubia, such reservoirs as Syene and Medinet Haboo, and the dams of rushes at Silsilis and elsewhere, which stored the water or arrested the destructive wave of some sudden burst of rain at the sources of that mountain torrent, the Blue Nile, liable to rise suddenly and sweep away everything it encountered on its rapidly descending course. By "Os-ir-is," however, ran "Is-is." Below the first cataract to the Delta the river was accompanied by a series of parallel canals. Confined between precipitous cliffs, the gorge, which it traverses for 600 miles, is nowhere more than nine miles broad in its cultivable area. This system required a "pontiff." An inexorable and to some extent arbitrary fiat determined the distribution of water for direct sustenance, irrigation and the countless industries which made the favored region, endowed with an inexhaustible water-power, the Yorkshire of the pre-Christian world.

The activity from which Hadrian shrank was, in Roman days, transferred to the North. In the fifth century, B. C. the old Memphite and Theban Empires were strewn with the wrecks of engineering and administrative machinery. Everywhere the traveller encountered profound mysteries.

A dry main was 'a secret passage;' a tank and siphon 'a royal tomb;' a disaster 'the sinister vengeance of a widowed sister and queen;' the sluices and water-wheels of a disused gate-house, 'the resting-place of crocodiles.' The '*fellah*' dreaded the rod which no longer punished the water-thief, who tapped an underground canal and fertilized his own fields at the expense of the health of a community. The Bedouin remembered the well which had once formed a distant station on some caravan route across the desert, doubly difficult or impassible since Persian jealousy or Greek ignorance had cut off its supply. Herodotus had his rivals in the construction of guide-books. He distinguished between three kinds of narrative. What he saw; what he heard and denied; and what information derived from any source, he stated for better or worse, as a mere reporter of wisdom or folly, to meet a popular and a scientific market. Therefore, he protected himself by saying: "Such as think the tales told by the Egyptians credible, are free to accept them for history; for my own part I propose throughout my whole work faithfully to record the traditions of the several nations."

In regard to Lake Moeris, his account extends into the traditional past. The officials told him that 'when Moeris was King, the Nile overflowed all Egypt, below Memphis, as soon as it rose so little as 12 feet. Now, Moeris had not been dead 900 years at the time when he heard this of the priests, yet in that day—B. C. 454—unless the river rose 24 feet, or at least 22 feet, 6 inches, it did not overflow the land.' But "Moeris" is not entitled to the final "s." "Meri" is only "river basin." The historian unfortunately labored under social disadvantages. As in the case



of the Labyrinth, he is like a visitor to Westminster in the hands of the custodian, while Strabo and Pliny, but five hundred years later, dine with the Dean and are shown antiquities by polished and learned hosts. A few verbal changes and the same passage reads: 'In the regime of the reservoirs from 2,000 to 5,000 tons per second of flow was diverted into them. The water irrigated the fields from the canals. A dyke of ten feet protected a village. For there was no danger from overflow. The desert consumed the surplus. While a hundred millions of tons per day, for double the period of beneficent Summer, watered three times the area of the present cultivated lands in the provinces of lower Egypt.'

The origin of "Meri" was traditional. The account of its size and shape are definitely assumed by the writer. Here, also, are measurements which he did not make himself, but the boatmen well knew its length and depth. It is only the work of an hour to climb the hill above Memphis to the south, and from its summit the general direction of a body of water 60 miles long and 8 to 20 wide would be sufficiently indicated by the lay of the land and its sparkle in the sun. Until within a few months this plain account has been flatly contradicted, or an attempt made to save the credit of the narrator by "the supposition that he embraced in his measurement the whole water system of the Fayoum," or had "confused units of measure," or "the direction of the canal" with that of the lake. It was said that the accounts of Herodotus (B. C. 454), Strabo (A. D. 24), Pliny (A. D. 50-70), were "widely different," and "irreconcilable;" that Moeris was "an artificial reservoir, 45 miles round, 25 feet deep at high Nile and drained at low Nile,"

when the water had been distributed over the adjacent fields. It was claimed that the position of the lake had been satisfactorily determined by M. Linant de Bellefonds. The theory of M. Jomard, who identified it with the Birket, or Lake, 'el-Qerun, with the depth increased by 20 or 25 feet and a moderate increase of area, was deemed refuted. "Ruins on the water's edge" showed "that its surface was at any rate never materially higher." And "though the position of Moeris was thus *satisfactorily* (!) determined, there was little or nothing to mark the ground it occupied."

The chief facts of Herodotus, in their general tenor, were repeated by Diodorus, Strabo, and Pliny. The differences are relatively minute. The discrepancies entirely disappear, if the changes of time and dynasty be considered. In place of confusion or contradiction there is an orderly series of natural alterations, substituting cultivated land for desert, or encroaching upon the lake with dykes to exclude its waters from the upper plateaux. Ptolemy, the Alexandrian geographer, gave its position by latitude and longitude, and named two towns in its neighborhood, in a very limited list. The maps which accompany his text marked a large body of water. In the sixth century it was still well enough known to indicate a town on its shore.

A condensed statement drawn from this evidence compels the belief that, of all the extant remains of antiquity in Europe, Northern Africa or Western Asia, none record such a signal and lasting victory of mind over matter as the wonderful inland sea of Egypt. Whether the concentration of human force or its wise application to a beneficent purpose was considered, the vast lake which, "owing to its size and depth, was for a thousand years capable of receiving the

superabundance of Nile water during the inundation, so that it might not wash away houses or drown the plantations of trees," bore off the palm, and this was conceded by Greek and Roman.

An intelligent Ionian, relying upon Herodotus in the fourth century, B. C., would have understood that a great reservoir of unequal depth, extended from northeast to southwest, nearly parallel with the Nile Valley, a short distance to the south and west of Memphis. Its surface multiplied by the height of the inundation equalled a considerable part of the volume of the excess of Nile water from June to January. Its shore line of 450 miles wound along sandy bays and under steep headlands. It was measured by the boatmen as sixty days' journey. The blue water was full of fish. Twenty-two kinds found a *habitat* in the various conditions it presented, from a sheer depth of 300 feet and rocky bottom, to canals, marshes, and reedy pools oftentimes thickly impregnated with salt. Its canal of supply became also an artificial outlet. Natural drainage contributed to lower its waters. When full it was above the cultivated land and in case of need furnished water to irrigate a large area of the Valley. If this Greek had lived in the days of Euripides or Aristotle he would have correctly supposed that no considerable population dwelt on the margin of the lake. If he were a contemporary of Cleopatra, the fame of olives, wine and roses would have instructed him in the change which had taken place on an upper plateau. If he supplemented the earlier author by Eratosthenes or Hipparchus, or purchased a copy of Strabo, he would have easily understood how the edge of the lake, like the margin of the sea shore,

was protected by dykes against the water of the canals which skirted it on one side and the lake which bounded it on the other. Had he travelled with Pliny, he would have noted with the quick eye and indefatigable pen of the Roman Admiral, not only that the water no longer rose after the inundation high enough to pour back into the valley, and that the lake was only 250 miles in circumference, but his attention might have been directed to the purpose of defense which it still served. For it stretched as a huge moat, protecting on the west the immense wealth of which Alexandria had been unable wholly to deprive her vanquished rival Memphis. If he purchased a map, as Aelius Aristides says that he did, about A. D., 180, the lake had shrunk to still smaller dimensions. The annual supply was reduced below what evaporation or underground percolation could dissipate. And if in the fifteenth century in the Carmelite monastery of Venice one had asked Fra Mauro what remained of the great sea, he would have been referred to two small pools which scarcely attract attention even upon the large map, prepared, in a seaport a few days' sail from Alexandria, by men to whom Egypt was personally familiar.

Turning from these ancient accounts to the accompanying map, there is no difficulty in perceiving that a body of water might pass by the Bahr Yusuf at low Nile, or directly from the submerged valley at Benisuef during the late Summer and early Autumn, to the West, where El-Lahun marks the commencement of the lateral canal, and limits with a dyke the amount of the flow. Seven feet is the usual difference between the water above and below it at low Nile. A fall of ten feet carries the

water through the town of Medinet el-Fayoum, marked as a small square + 75. A large part has already been diverted. One branch running northward to the Kasan or pond of Tamieh, falls over a dam about thirty feet high into a deep cut between the limestone walls leading westward to the Lake. The canal to the south, falling fifty feet in twenty miles, turns undershot millwheels and loses itself in a plain, where old vineyards and Bedouin tents, fortified towns and Arab villages are still subject to capricious changes, indicated by the name of Gharaq, or the deluge. Desert, lake, field, canal and village shift their respective places, to the utter confusion of the cartographer.

The channel which, passing to the south round the dyke of the 'Moeris of M. Linant,' winds west and north across the 'Moeris of Jomard,' is a principal affluent of the Lake El-Qerun. It enters it over a flat, marshy shore, covered with bushes or low trees of tamarisk, and forming border land useless for cultivation. Opposite its mouth - 160 shows that, like the Dead Sea, the surface is below the Mediterranean. If to the + 85 of El-Lahun be added 30 to 50 feet for the depth of water, it gives more than the 50 paces of Pliny and about the 50 fathoms of the Greeks. Dimeh + 90 is above Wasta, and therefore its "street of lions" would not be submerged if the entire basin were filled. Qasr Qerun, to the south, would be under water. But even Hadrian, A.D. 130, may not have seen its temple. It is late in style and offers no difficulty. It is in the latitude and longitude given by Ptolemy for Moeris itself. Jomard thought it marked its southern extremity. But an ancient canal, until a recent period, conducted the water round the high, flat peninsula, which, 200 to 225

feet above the sea, separates it from the shallower basin of Gharaq. A 'Gisr' or embankment stretches across the entrance to the Wadi Moïeh and Reian. If the water were carried round the point, a depth equal to the northern basin could be obtained under the brow of the hill, where -180 is near +225. That valley is closed to the southwest by steep slopes of sand. The wall becomes more abrupt as it passes northward behind the Heram or Pyramid Meruet el-Berl—"the Meri of the Mule"(!).

Except in a bay of doubtful extent near Dimeh and a narrow gorge towards Oxyrhynchus, there are three well-defined basins, which, if the dyke at El-Lahun should give way and remain unrestored, would offer a sheet of water of the circumference and direction of "Meri," and in depth, color, purpose and elevation above the Delta, exactly fulfilling all requirements.

The map, however, differs from all other maps of this part of Egypt, in the most essential particulars. It owes its existence to the assumption that the descriptions of Lake Moeris were correct. Taking the original words in their natural sense, the measurements, maps and terms in the spirit of the age for which they had been made; acknowledging the competence of Strabo and Pliny to pronounce between the aqueducts of Rome and of Memphis, the temples of Ephesus and Karnak; preferring the calm and just appreciation of these experienced men of the world to the unscientific outbursts of mere students and *doctrinaires*; the unchallenged accounts of officers and gentlemen of the highest standing, to the narrow experience of a local engineer, pronouncing everything impossible which his mind could not grasp or his means execute—any other map but

this presents insuperable obstacles. It is, therefore, indispensable to show the errors of previous cartographers and the material from which this was composed.

The maps prior to 1765 are a most interesting study.\* A minute examination of upwards of a hundred, on papyrus and parchment, in fresco and in print, hieroglyphic and conventional, Egyptian, Greek, Latin, Arabic and Italian, yielded most valuable results. Whatever may appear to the contrary in the works of distinguished Egyptologists, these do not contradict the plain statement of the ancient authors, or offer any support to the hypothesis of M. Linant de Bellefonds. The beautiful work of the accomplished D'Anville, in 1765, was rather the expression of refined scholarship than of sound cartography. The forty-seven great sheets in which the *savants* attached to the French invading army recorded the route which it traversed and the region which it occupied on the Nile and in Syria, are of very unequal value. Splendid specimens of engraving, skilfully devised to cover the imperial retreat, they served with the accompanying text to convert strategic defeat into scientific victory. Jacotin and Jomard wore the laurels which Acre denied to Bonaparte, and the assassin's dagger to Kleber. But when the eye rests upon square yards covered with dots placed with great technical skill to represent the desert, the observer, who remembers that its importance is confined to a comparatively small part of the surface included within the four corners of many sheets, is tempted to regret this prodigality. Unfortunately there is little to

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\* The Society possesses, in its Bulletin No. 1, 1879, a learned and exhaustive *résumé* of the early history of cartography by its President. It is not, therefore, necessary to repeat the facts there stated.

show where the theodolite rested and the burin proceeded alone. From the most conscientious and thorough survey, based on a careful triangulation of well-known points, to the report of an Arab, imperfectly understood and erroneously transcribed, or, from the accurate drawing of a building, measured in all its parts, to a hasty pencil sketch and guess at dimensions, this material was worked up in Paris, and although it furnished an exhaustive treatment of much of the area of Egypt, and especially of the cultivated part of the Fayoum, it was strangely inadequate and perplexing in its record of positive error.

A colored map of Lower Egypt, on a scale of 1:200,000, was published by Brockhaus in Leipsig in 1876. The names are printed in Arabic. It was the work of Mahmoûd Pacha, and embraced a large number of astronomical observations. He surveyed the neighborhood of Lake Mareotis for the "Cæsar" of Napoleon III., but adopted the French map beyond the area of cultivated land to the south of Alexandria.

In 1822 Mohammed Ali had instituted, under an Italian, Mazi, a survey of certain parts of Lower Egypt. The results, however, were mislaid or lost. In 1879 a special department was formed to carry out a similar work, and the '*cadastre*' has since been engaged, with engineers of every nationality, in plotting the estates of peasants and nobles with a view to a readjusted and more equitable incidence of taxation.

The map of the Fayoum, published in 1859 in the *Denkmäler aus Ægypten*, was directly due to M. Linant de Bellefonds. This French engineer, in the service of the Khedive, says (*Mémoires*, 1872-3, p. 492,) that an accurate map, 1:10,000, was executed by a European engineer under his



direction. It met with a series of misfortunes and passed into oblivion. But in 1843 the Société Egyptienne of Cairo published a *mémoire* on Lake Moeris, with a map 1:250,000. Lithographed in Cairo, and with discreditable carelessness, it was the source from which the scientific world obtained its information for over a quarter of a century. It was not so much a map of the Fayoum as a sketch to show that there had been a reservoir on the upper plateau formed by two dykes on the north, west and southwest, and by the Sedment range on the east, which M. Linant called Moeris, and substituted for that described by the Greek historians who saw it, and the Alexandrian cartographers who sketched its shape and fixed its position. It contained a section which will always possess an interest as showing the possible aberration of a professional engineer of the highest standing and undisputed integrity. It is this line of levels, run at some unknown period prior to 1842, which is alone responsible for the thousand-times repeated error that the Birket-el-Qerun is about the level of the Mediterranean. In 1854, a 'Carte Hydrographique de la Moyenne Egypte' reproduced this map. In 1859, Lepsius, with the skillful aid of German engravers and the misplaced liberality of the Court of Berlin, not only perpetuated these blunders, but lent the weight of his personal authority to errors so obvious that it is utterly inconceivable how he could have been thus deceived. Necessarily, during this period and prior to 1872, countless reproductions of varying pretensions were uttered by European map-makers. Having myself examined them by scores, it proved curious and easy to group them by blunders into families. The date of a map, like that of a cursive MSS., proves but little.

Figari Bey, in 1864, published “*Etudes Géographiques et Géologiques de l’Egypte, de la Péninsule de l’Arabie Petrée et de la Palestine.*” No cabinet geognostic ever produced less accurate results than Sections 6, 7 and 8. The “clayey limestone” follows the graceful curves of the hills, or offers a shelter to the pyramids of “Zakarah.” The stately Italian sentences lend themselves, with equal disregard of geological laws, to picturesque description of scenery, evidently borrowed from M. Linant or the rapid march of Gen. Andreossy, Pluviose, an 7 (Jan., 1799).

In 1870–73, Linant Pacha issued in Paris, at his own expense, a very costly work, entitled “*Mémoires sur les Principaux Travaux d’Utilité Publique Exécutés en Egypte,*” text and atlas; Arthus Bertrand, *éditeur*. It resembles the publication of Prisse d’Avennes only in its technical finish. Respect for age and personal worth limit legitimate criticism to the bare statement that it has no interest beyond the Fayoum. The map is little more than a repetition of the old sketch of 1843. The canals and basins are laid down with a reasonable approximation to truth. The towns and villages are incorrectly named and placed. A capital sin of omission to the north is the great dyke so conspicuous near Tamieh. To the south and west the chromolithographer, stimulated by the yellows and greens of Figari, flung across the lofty and monotonous table-land of Jacotin’s engraver, crimson and dark-gray masses, while a thick cloud upon the mount “Medaïé el-Hebgad” of d’Anville justifies the terrors which, according to Brugsch, the “nameless nome” of Egypt inspired in the breast as well of the Theban Hume as the Memphite Macaulay. But the section through Medinet-el-Fayoum is in striking

contrast, not only to the nebulous hues into which the sun of observation sets, but to that pretentious little profile by which Lepsius had too successfully sought to show that 'excavation' was to be interpreted 'wall,' and "fossa grandis" translated "a shallow reservoir." This corrected section, however unfair, forced, inaccurate and palpably erroneous, showed that the 'great and ancient dyke' of Lake Moeris, and the present dyke of El-Lahun kept the waters of the Bahr Yusuf out of a deep erosion, which, in a single year, would otherwise be filled to a depth neither more than the fifty fathoms (300 feet) of the Greek geographers nor less than the fifty paces of the Roman Admiral.

The text inserts in certain places corrections which correspond to these changes, but the discoverer, or rather inventor, of Moeris had too much regard for the reputation of the Egyptologists who had accepted his statements, and the momentum of a scientific error of great specific gravity, passing with velocity through innumerable channels of thought, to draw attention to the *errata*, or change his syllogism because Rousseau Bey and a sugar railway had converted his minor premiss into its contradictory opposite. For, about 1871, the present Director of Public Works was requested by Ismail Pacha to examine the Lake el-Qerun with a view to draining it. He reported this impossible, because it was about 200 feet below the level of the Mediterranean. In February, 1880, the *Gesellschaft für Erdkunde*, of Berlin, published a map drawn by Dr. G. Schweinfurth, with a section whose elevations vary from those of Linant, but only to give more striking confirmation to the technical accuracy of Herodotus, Diodorus, Strabo and Pliny. Its

*Zeitschrift*, of May, contains a description of the map, and valuable information on collateral points. Petermann's *Mittheilungen*, 1880, probably obtained from it the  $-42m$ . which appears in *T.9.* from which Junker's route was taken for the map printed herewith. In 1881, L. Olyphant had noticed this singular fact, but neither these distinguished authors nor their reviewers were led to modify their agreement with the location assigned to the ancient lake in Linant's memoir of 1843. The discovery of this error in level, in September, 1881, stimulated me to fresh exertions, and justified me in disregarding both the French and German authorities. It seems strange that neither in the British Museum nor the Royal Geographical Society, in the *Bibliothèque Nationale* and at the *Société de Géographie*, in the shops of London, Paris, Alexandria and Cairo, was any clue or hint given me of the two maps of 1880. To Dr. Schweinfurth himself, whose kind attentions I am anxious to acknowledge in the fullest manner, I owed *after* my return from my first exploration the suggestions which enabled me to affirm my own conjectures and their realization.

It may be taken as an admission of ignorance, but it cost me months of time and a very considerable amount of trouble to get together the few sheets and volumes which I now feel fairly sure represent all the latest information. A map of  $\frac{1}{40000}$ , traced by me from the original in the possession of Rousseau Bey, the field books of M. Julliot, the maps of the *Cadastre* in the Government House at Medinet el-Fayoum, days and nights spent with M. Stadler at Minieh, invaluable discussions with Col. Mason Bey, Chief of the *Cadastre* in the Fayoum, the privilege of unrestricted inter-

course with Lieut. Gen. Stone Pacha, also our countryman, are only a part of the efforts made to arrive at the truth. Having, according to Dr. Schweinfurth, been the first European who visited the "Heram," south of Qasr Qerun, and "affirmed, in March, the existence of a depression to the south of the Fayoum which might serve as a waste-weir for the excess of the Bahr Yusuf," I applied to the Egyptian Government for an engineer to run a line of levels through lat. 30°, intending to cross the desert to Junker's track, and push on far enough West to dispose of the question whether Moeris had extended to the north of the Fayoum, with such ancillary points as the site of Bacchis—a town or strategic position of the first rank in Roman days—the character of the desert, and especially traces of those "Fountains of the Sun" which I believed had existed, and which would have been formed by water following the limestone and rising to the surface through the crevices into the hollows or oases. If, however, an Arabian monarch had, as Herodotus reported, anticipated the pipe lines and flumes of our oil wells and silver mines, and conducted water through leather mains for several hundred miles, it was possible that Roman garrisons and commercial stations had marked and facilitated such routes as that towards Carthage, obtaining water from Moeris, but by artificial means. Then returning southward to the Fayoum, and sending in for fresh supplies, if all went well it would have been possible to examine remains of which I had heard from the Copts of Senhur and the Bedouins of Gizeh, said to lie to the west of Lake el-Qerun, and at all events follow the limestone chain, and close forever the gaps marked to the southwest. Stone Pacha,

Chief of Staff, at once proceeded to organize an expedition, placed an engineer at my disposal, selected soldiers, repaired instruments, and as the *Khamsin*, or period of hot winds, was rapidly approaching, hastened preparations so that in less than five days all would have been completed. Arabi Pacha, although he had approved the enterprise and sanctioned the expedition, interposed obstacles. The war was imminent. It is quite possible that, in all kindness, he foreboded for me a fate like that of Professor Palmer. Having determined to go, it was intimated that it must be alone, and consent to take a French engineer was refused. A well-known and very skillful Englishman, Mr. W. F. Petrie, had been long engaged in surveys on the Gizeh plateau. I met him there by accident the night before my departure. He at once agreed to give me two full days. Starting at daybreak, with all the necessary instruments, he surveyed from the summit of Kom el-Kashab, in the valley below, at camp to the south, and on the ridge west of Memphis, and mapped the portion which includes the Wadi Fadhi. The *double* valley, apparently marked by Jacotin and repeated by Mahmoud, has been effaced from the latest maps. This was thought "a new and valuable addition to the cartography of Egypt" because, without doubt, in this direction the underground escape of water took place, filling the lakes in the Natron Valley. With a head of about 100 feet, the water, which now only oozes after many months, would have abundantly supplied the entire district, called Scythiaca (from Shet), or Marmarica (from Meri), the two equivalent terms for the vast lake 40 miles to the south.

In fulfillment of my promise to him, I returned with Mr. Petrie to Sakkarā, and arranged with Mr. Ellis, artist,

author and engineer, with the valuable experience of a journey across the Syrian Desert, for a week to be passed in following the contour of the Fayoum basin, on the east, north and west. It was primarily with me a search for the Labyrinth, and an examination of the reputed remains of ancient civilization, so as to dispose of the fatal objection made by Jomard, and repeated by the very latest writers, that the Arsinoïte nome with fruitful fields and splendid edifices had, from before the first Olympiad to the Middle Ages, occupied the plateau which on the map separates the 'Moeris of Jomard' from the 'Moeris of M. Linant.' It was especially important to strike into the desert to the north, and coming back to the lake, take soundings, visit Dimeh, to determine its age and elevation, and the island, with remains, which my Arab companions had called the palace of Haroun. We accomplished this. The map, however, scarcely shows even to an expert the minute changes which ought to be made, for this part had been triangulated with reasonable accuracy. At the edge of the lake, Mr. Petrie again joined me. Returning to Medinet, the obelisk of Ebgig and the alleged 'pyramids' (!) of Bihamu were measured and photographed. Starting again on camels, traversing and examining for the third time the dyke towards Gharaq, we spent the night of April 4 under a steep cliff in the Wadi Reian. The old water-line was plainly visible. Repeated observations with an excellent aneroid, the geological formation and outcrop, and surveys with a theodolite, left no doubt that the southwest basin is substantially as marked. When subsequently plotted, and the western limit filled in to the north from my own previous desert ride of twenty hours, and to the

south from the travels of Mason Bey, Calliaud and Belzoni, it was evident that this basin was the Lacus Meridis of Cl. Ptolemy. Apart from its practical value to the engineer, the archæologist gladly accepted a strong proof that the maps attached to the text printed in Rome were drawn prior to the Arab invasion in the seventh century. Whether the valley extends as far towards Oxyrhincus, as it appears on those maps, or whether the transcriber, mistaking the long gorge for the canal of supply, somewhat exaggerated it, was a tempting problem, which, after fruitless efforts to secure the necessary assistance, was left with the assurance that it would be determined, if not sooner, at least when M. Maspero, so skillful and thorough, makes Behnesa a point of departure for his projected examination of that most important district. Two months afterwards, in Paris, however, I found in the *Zeitschrift g. f. E.*, 1880, p. 160, in the concluding passage of Dr. Schöweinfurth's notes on his map: "According to Ascherson's observations, the following are the elevations of points within the area of this map of the Fayoum: Benisuef, 28*m.* (91 feet) *above* the sea; Medinet el-Fayoum, 23*m.* (75 feet); the town near Gharaq, 2*m.* (6½ feet); Valley of Reian, at the edge of the desert plateau southwest of Gharaq, 29*m.* (95 feet) *below* the level of the Mediterranean," and therefore 57*m.* (188 feet) *below* the level of the Nile.

These observations, therefore, prove, it seems, beyond possibility of error, that the accounts of the ancient historians are entirely credible, and that the Meridis Lacus of the later Roman age might be reconstructed without great expense, and furnish at least a waste-weir for the Bahr Yusuf and the Nile.



The Bahr Yusuf was at one time, in part of its course, the principal stream. It has always been a natural branch of the river, artificially controlled, rather than a canal. Whether before 'Cambyzes, son of Cyrus,' it flowed through the Labyrinth, as I have conjectured, with inference and argument drawn from innumerable sources and strangely corroborative, at all events, after the Persian invasion to the Ptolemaic *renaissance*, no effort appears to have been made to control it at the gorge near Wasta. Like the Albert Nyanza to the south, Moeris simply served as a vast natural receptacle for a considerable part of the annual flood. The Greek or Roman engineers subsequently barred the entrance, and with double canal and sluices stored up and distributed the excess. The later empire permitted the inhabitants of the Fayoum to encroach upon the lake. The canal was tapped at a hundred points in its course of 207 miles. The water which reached El-Lahun was easily diverted to the river. The extreme fertility and large population of the northern depression present the most striking contrast to the utter desolation of the Wadi to the south. It demonstrates that during the early centuries of our era the southern basin was able, to a partial extent, in the words of Strabo, "to receive the superabundance of water which flowed into it at the time of the rise of the river, without overflowing the inhabited and cultivated parts of the country." It prevented such disasters as the recent destruction of the village of Gizeh and the deplorable loss of many hundred lives ; it protected the Fluvius Trajanus, the Cairo-Suez canal of the day. The supply of water to the Fayoum, having thus been rendered completely artificial, appears to have reached its lowest point about twenty

years ago. Since that time, a change made near Siût, and the removal of silt from the bed of the canal, have effected an enormous increase in the volume which pours into the Birket el-Qerun. Apart from the danger of a deluge, to which 150,000 souls are now exposed every summer, even during low Nile, the lake increases at the rate of more than an inch in each winter month. The water of the lake is no longer too salt to drink even off the Western shore. It calls for prompt action against the continual menace of an appalling catastrophe, and the steady and rapid destruction of valuable land. On every account, therefore, my 'investigations should be turned to practical account' and a survey made, without delay, of the Wadi Moiëh, the exact height of the 'Gisr' determined, the old canal towards the Qasr Qerun reopened, the surplus of the inundation diverted through it into the Wadi Reian, and the present lake reduced to its mediæval proportions.

Is there not also a lesson for the New World? Ought not the Mississippi to be treated like the Nile? The engineers who derive their technical education in geometry from the builders of the Pyramids can afford to accept instruction in hydro-dynamics from the Pontiffs of Lake Moeris.